

# TTS-3000A



## Specifications

- Speeds:**  $33\frac{1}{3}$  rpm and 45 rpm
- Speed control range:**  $\pm 5\%$
- Start-up time:** within one second
- Flutter and wow:** Less than 0.05%
- Signal-to-noise ratio:** Greater than 47 dB
- Power requirements:** 100, 117, 220, or 240V 50/60 Hz
- Power consumption:** 4 VA
- Turntable:** 12" (30 cm), 2 lb 10 oz (1.2 kg)
  - diecast-aluminum
  - belt-drive system
- Weight:** 11 lb (5 kg)
- Dimensions:**  $14\frac{1}{2}"$ (W)  $\times$   $5\frac{1}{8}"$ (H)  $\times$  15"(D)  
(370  $\times$  130  $\times$  380) mm

**SONY®**  
**SERVICE MANUAL**

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Complete Spare Parts List for TTS-3000A (E, UL, CSA, SEMKO)

March, 1969

<u>Part No.</u>	<u>Description</u>	<u>Q'ty</u>	<u>Unit Price</u>
<b>I. Mechanical Parts</b>			
X-20617-01	Turntable Base Ass'y -----	1	
2-061-701	Turntable Base (A) -----	1	
-702	Turntable Base (B) -----	1	
7-621-468-48	Screw, machine (+) T 4 x 6 -----	3	
X-20617-02	Turntable Ass'y -----	1	
X-20335-02	Bearing Ass'y, turntable -----	1	
-03	Thrust Screw Ass'y -----	1	
2-033-507	Cap, bearing -----	1	
X-20335-06	Water Level Ass'y, turntable -----	1	
-07	Motor Ass'y -----	1	
2-033-518	Pulley, motor -----	1	
-519	Bracket, motor -----	1	
-520	Cushion A; motor support -----	3	
-521	Cushion B; motor support -----	3	
-522	Screw, motor support -----	3	
-523	Washer 3.4ϕ (A) -----	3	
-535	Washer 4.5ϕ (B) -----	3	
7-621-713-17	Screw, set 3ϕ x 3 -----	2	
8-834-502-01	Motor (D-502F) -----	1	
7-621-717-07	Screw, set 5 x 4 -----	1	
X-20335-09	Speed Selector Lever Ass'y -----	1	
-04	Plate Ass'y, speed selector switch -----	1	
-05	Arm Ass'y, speed selector -----	1	
2-033-528	Spring, power ON/OFF switch -----	1	
-529	Washer, speed selector switch -----	8	
-530	Lever, speed selector -----	1	
-531	Screw, restrictor lever -----	1	
-553	Lever, restrictor -----	1	
-554	Collar, restrictor lever -----	1	
-555	Screw, restrictor collar -----	1	
-557	Spring, stepper -----	1	
1-514-057	Micro Switch, speed selector -----	3	
X-20335-10	Knob Ass'y, speed control -----	1	
-08	Knob Ass'y with Bracket, speed control -----	1	
2-033-561	Bracket, speed control support -----	1	
1-221-727	Potentiometer, speed control -----	1	
X-20335-15	Servo Amp Chassis Ass'y -----	1	

<u>Part No.</u>	<u>Description</u>	<u>Q'ty</u>	<u>Unit Price</u>
2-033-532	Stud, transformer support -----	4	
-562-09	Servo Amp Chassis -----	1	
2-061-704	Plate, strobe -----	1	
-706	Label, specification -----	1	
2-033-533	Bracket, transformer support -----	1	
-534	Stopper, transformer -----	2	
-539	Lug, grounding -----	1	
-540	Plate, shield -----	1	
-543	Rubber Mat, turntable -----	1	
-547	Ornamental Plate -----	1	
-550	Lens, neon lamp -----	1	
-552	Screw, speed selector -----	1	
-560	Washer 2.5ø, rubber -----	3	
-563	Cover, chassis -----	2	
-564	Cover, neon lamp -----	1	
-565	Terminal Board -----	1	
-584	Spacer, power transformer; rubber -----	1	
-585	Retainer, stroboscope -----	4	
-591	Plate, dash-board -----	1	
-592	Insulator, neon lamp -----	1	
-593	Insulator -----	1	
-596	Cover, micro switch -----	1	
-600	Insulator -----	1	
0-049-136-00	Rubber Cushion -----	4	
2-009-310	Bag, polyethylene (RK-35) -----	1	
2-029-953-02	Label, voltage indicate -----	1	
3-403-808-01	Cover, AC socket -----	1	
3-409-150	Nut, hex -----	2	
3-410-032	Grommet, AC cord -----	1	
3-793-055-31	Manual, VPl caution -----	1	
3-821-536	Cushion -----	1	
3-822-634	Heat Sink -----	1	

Screws, Washers & Nuts

7-621-162-13	Screw, machine (+) R 3 x 18 -----	1
-261-23	Screw, machine (+) RF 3 x 4 -----	8
-33	Screw, machine (+) RF 3 x 5 -----	6
-43	Screw, machine (+) RF 3 x 6 -----	10
-53	Screw, machine (+) RF 3 x 8 -----	5
-63	Screw, machine (+) RF 3 x 10 -----	10
-73	Screw, machine (+) RF 3 x 12 -----	4

<u>Part No.</u>	<u>Description</u>	<u>Q'ty</u>	<u>Unit Price</u>
7-621-262-03	Screw, machine (+) RF 3 x 16 -----	4	
-53	Screw, machine (+) RF 3 x 25 -----	1	
-713-17	Screw, set 3 x 3 -----	2	
-999-69	Nut, hexagonal head 5 x 12 -----	3	
7-622-105-02	Nut 2φ -----	2	
-308-02	Nut 3φ -----	12	
-110-02	Nut 4φ -----	3	
7-623-108-12	Washer 3φ -----	17	
-110-12	Washer 4φ -----	3	
-208-27	Washer, spring 3φ -----	6	
-210-28	Washer, spring 4φ -----	3	
-212-27	Washer, spring 5φ -----	3	
-408-04	Lock Washer 3φ -----	3	
-616-01	Eyelet 2 x 3 -----	2	
7-624-108-05	Retaining Ring 4φ (E) -----	4	
-109-05	Retaining Ring 5φ (E) -----	1	

#### Accessories & Packing Materials

3-701-020	Bag, check sheet -----	1	
-028	Label, tack 50 c/s -----	1	
2-033-583	Adaptor, 45 rpm -----	1	
-011	Bag, polyethylene -----	1	
7-623-110-11	Washer 4φ -----	4	
7-621-269-23	Screw, machine (+) RF 4 x 20 -----	4	
-846-48	Screw, wood (+) R 4.1 x 16 -----	4	
X-20438-01	"SONY" Oil Ass'y -----	1	
X-20335-17-2	Belt Case Ass'y -----	1	
2-033-571-21	Carton, turntable -----	1	
-572	Cushion -----	1	
-573	Cushion (A), turntable base styro-foam -----	1	
-574	Cushion (B), turntable card board -----	1	
-576	Cushion (A) for Rubber Mat, card board -----	1	
-577	Cushion (B) for Rubber Mat, card board -----	1	
-578	Bag, polyethylene, turntable base -----	1	
-579	Bag, polyethylene, (turntable) -----	1	
-580	Bag, polyethylene, rubber mat -----	1	
3-790-818-11	Manual, instruction -----	1	
3-793-132-11	Mounting Diagram -----	1	

<u>Part No.</u>	<u>Description</u>	<u>Q'ty</u>	<u>Unit Price</u>
<u>Electrical Parts</u>			
1-538-418-17	Printed Circuit Board -----	1	
	Transistor 2SC292-30 Q7 -----	1	
	2SC318-152 Q6 -----	1	
	2SC401-5 Q1,3,5 -----	3	
	2SC402-4 Q4 -----	1	
	2SC402-5 Q2 -----	1	
	Zener Diode RD-7A D4 -----	1	
	Varistor VR-60 V -----	1	
	Silicon Diode FR-1U D5,6,7,8,9,10 -----	6	
	Diode 1T22 D1,2,3 -----	3	
1-221-389	Resistor, adjustable 5k $\Omega$ (B) R10,16 -----	2	
1-423-100	Transformer, input T1 -----	1	
1-105-661	Capacitor, mylar 0.001 $\mu$ F $\pm$ 10% 50WV C23 -----	1	
-673	Capacitor, mylar 0.01 $\mu$ F $\pm$ 10% 50WV C20 -----	1	
-515	Capacitor, mylar 0.015 $\mu$ F $\pm$ 5% 50WV C5,6 -----	2	
-517	Capacitor, mylar 0.022 $\mu$ F $\pm$ 5% 50WV C3,4,11,13 -	4	
-519	Capacitor, mylar 0.033 $\mu$ F $\pm$ 5% 50WV C7,9,10,24 -	4	
-521	Capacitor, mylar 0.047 $\mu$ F $\pm$ 5% 50WV C8,12 -----	2	
-685	Capacitor, mylar 0.1 $\mu$ F $\pm$ 10% 50WV C25 -----	1	
1-121-343)	Capacitor, electrolytic 1 $\mu$ F 12WV C17,18 -----	2	
-442)			
-471	Capacitor, electrolytic 10 $\mu$ F 12WV C1,2,15 -----	3	
-484	Capacitor, electrolytic 30 $\mu$ F 12WV C19 -----	1	
-489	Capacitor, electrolytic 50 $\mu$ F 12.5WV C21 -----	1	
-491	Capacitor, electrolytic 100 $\mu$ F 6.3WV C16 -----	1	
-727	Capacitor, electrolytic 470 $\mu$ F 16WV C22 -----	1	
1-201-302	Resistor, composition 3 $\Omega$ $\pm$ 10% RC1/2 R33 -----	1	
-083	Resistor, composition 560 $\Omega$ $\pm$ 10% RC1/2 R27 -----	1	
-021	Resistor, composition 1k $\Omega$ $\pm$ 10% RC1/2 R3,4,26,32	4	
-654	Resistor, composition 1.5k $\Omega$ $\pm$ 10% RC1/2 R31 -----	1	
-318	Resistor, composition 1.8k $\Omega$ $\pm$ 10% RC1/2 R1 -----	1	
-304	Resistor, composition 2.2k $\Omega$ $\pm$ 10% RC1/2 R2,30 --	2	
-089	Resistor, composition 4.7k $\Omega$ $\pm$ 10% RC1/2 R29 -----	1	
-090	Resistor, composition 6.8k $\Omega$ $\pm$ 10% RC1/2 R17 -----	1	
-041	Resistor, composition 10k $\Omega$ $\pm$ 10% RC1/2 R24,25 -	2	
-087	Resistor, composition 22k $\Omega$ $\pm$ 10% RC1/2 R28 -----	1	
1-242-649	Resistor, carbon 100 $\Omega$ $\pm$ 5% RD1/4UR R23 -----	1	
-693	Resistor, carbon 6.8k $\Omega$ $\pm$ 5% RD1/4UR R11 -----	1	
-695	Resistor, carbon 8.2k $\Omega$ $\pm$ 5% RD1/4UR R5 -----	1	
-704	Resistor, carbon 20k $\Omega$ $\pm$ 5% RD1/4UR R13,14 -----	2	
-705	Resistor, carbon 22k $\Omega$ $\pm$ 5% RD1/4UR R7,8 -----	2	

<u>Part No.</u>	<u>Description</u>	<u>Q'ty</u>	<u>Unit Price</u>
1-242-713	Resistor, carbon 47k $\Omega$ $\pm$ 5% RD1/4UR R6,12 -----	2	
-692)	Resistor, carbon 6.2k $\Omega$ $\pm$ 5% RD1/4UR) R9		
-693)	Resistor, carbon 6.8k $\Omega$ $\pm$ 5% RD1/4UR) (Adjust) --	1/2	
-689)	Resistor, carbon 4.7k $\Omega$ $\pm$ 5% RD1/4UR) R15		
-691)	Resistor, carbon 5.6k $\Omega$ $\pm$ 5% RD1/4UR) (Adjust) --	1/2	

#### General Items

1-101-534	Encapsulated Component 0.1 $\mu$ F $\pm$ 20% 500WV -----	1	
1-231-057	Encapsulated Component 0.033 $\mu$ F 120 $\Omega$ 500WV ---	1	
1-441-207	Transformer, power T2 -----	1	
1-519-017	Lamp, neon -----	1	
1-526-165	Selector, power voltage -----	1	
1-534-487-21	Cord, power -----	1	
1-536-016	Terminal Strips 1-1LP -----	1	
-029	Repeater, 4P -----	1	
1-201-087	Resistor, composition 22k $\Omega$ $\pm$ 10% RC1/2 R190--	1	

#### Mounted Circuit Board

X-20335-52-4	Mounted Circuit Board -----	1	
	* * * *		

#### Additional Parts List for UL Model

2-061-707	Label, specification -----	1	
2-033-536	Conduit, flexible (A) -----	1	
-537	Conduit, flexible (B) -----	1	
-595	Cover, voltage selector -----	1	
3-422-204-04	Label, caution -----	1	
3-790-818-21	Manual, instruction -----	1	
	Card, warranty -----	1	
	Card, warning -----	1	
2-033-594	Master Carton (for two sets) -----	1/2	
1-101-918	Capacitor, ceramic 0.001 $\mu$ +80% -20% 25WV		
	C26,27 -----	2	
1-534-526-21	Cord, UL -----	1	

<u>Part No.</u>	<u>Description</u>	<u>Q'ty</u>	<u>Unit Price</u>
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Additional Parts List for CSA Model

2-061-708	Label, specification (CSA)-----	1	
3-407-956	Label, caution -----	1	
	Card, warning -----	1	
	Warranty Station List -----	1	
	Card, guarranty -----	1	

Additional Parts List for SEMKO Model

X-20335-26	Actuator Ass'y, power switch -----	1	
-27	Bracket (B) , power switch support -----	1	
-28	Arm Ass'y, speed selector -----	1	
-29	Plate Ass'y, speed selector switch -----	1	
-30	Servo Amp Chassis Ass'y -----	1	
2-049-219	Cover, microswitch -----	1	
-220	Insulator (A) -----	1	
-221	Insulator (B) -----	1	
-222	Bracket, fuse holder -----	1	
-223	Plate, speed selector switch -----	1	
-224	Label, fuse indicate -----	1	
-225	Bushing, cord -----	2	
-226	Washer (B), speed selector switch -----	3	
3-001-706	Retainer, Wire -----	1	
3-413-691	Clamp -----	2	
7-621-255-43	Screw, machine (+) RF 2 x 6 -----	2	
-262-23	Screw, machine (+) RF 3 x 20 -----	2	
7-623-205-22	Washer, spring 2ø -----	2	
7-624-104-05	Retaining Ring 2ø -----	1	
3-790-818-11	Manual, instruction -----	1	
1-441-390	Transformer, power -----	1	
1-514-426	Microswitch S3 -----	1	
1-532-063	Fuse F1 -----	1	
-074	Fuse F2 -----	1	
-202	Fuse F3 -----	1	
1-533-026	Holder, fuse -----	1	
1-534-153	Cord, power -----	1	



## SECTION 1

### TECHNICAL DESCRIPTION

#### 1-1 GENERAL INFORMATION

The TTS-3000A employs a low-speed servo-controlled motor to drive the turntable. The use of a slow-speed motor eliminates much of the noise and rumble that originates in mechanical speed-reducing systems. This unique servo system effectively compares motor speed with a very stable frequency reference. Any error in motor speed results in a correction in the current supplied to the motor.

The speed reference is entirely independent of outside influence. Line frequency is used only to power the strobe light. In addition this turntable is designed for not only with SONY Tone Arms PUA-237 and PUA-286, but other tone arms as well.

#### 1-2. TECHNICAL SPECIFICATIONS

Speeds:	33-1/3 rpm and 45 rpm
Speed control range:	±5%
Start-up time:	Within one second
Flutter and wow:	Less than 0.05% rms
Signal-to-noise ratio:	Greater than 47 dB
Power requirements:	100, 117, 220, or 240 V 50/60 Hz
Power consumption:	4 VA
Turntable:	12" (30 cm), 2 lb 10 oz (1.2 kg) diecast-aluminum belt-drive system

Weight:	11 lb (5 kg)
Dimensions:	14-1/2" (width) × 5-1/8" (height) × 15" (depth) 370mm (width) × 130mm (height) × 380mm (depth)

#### 1-3. CIRCUIT DESCRIPTION

Basic servo action is illustrated in the block diagram of Fig. 1-1. In this system the rotational speed of turntable is measured by a tone generator (frequency generator) coupled to the shaft of the drive motor. The frequency of the signal produced by the tone generator is exactly proportional to the speed of the turntable. This signal is amplified and limited to remove all amplitude variations and then passed through a passive RC filter which serves as the speed reference for the system. The output of this filter falls when the speed exceeds the design figure, and rises if the speed falls below the design point. Following the filter is a detector, which is simply a fullwave rectifier and ripple filter. The output of this detector is a dc voltage which controls the conduction of a two-stage dc amplifier. This amplifier, in turn, controls the current supplied to the motor. Operating characteristics of the servo system are shown on the graph of Fig. 1-2. The dashed line shows frequency-versus-speed relationship for the tone generator. The solid graph is the response of the filter. A stable operating point for the system occurs where the two graphs cross, and the system acts to maintain this operating point.

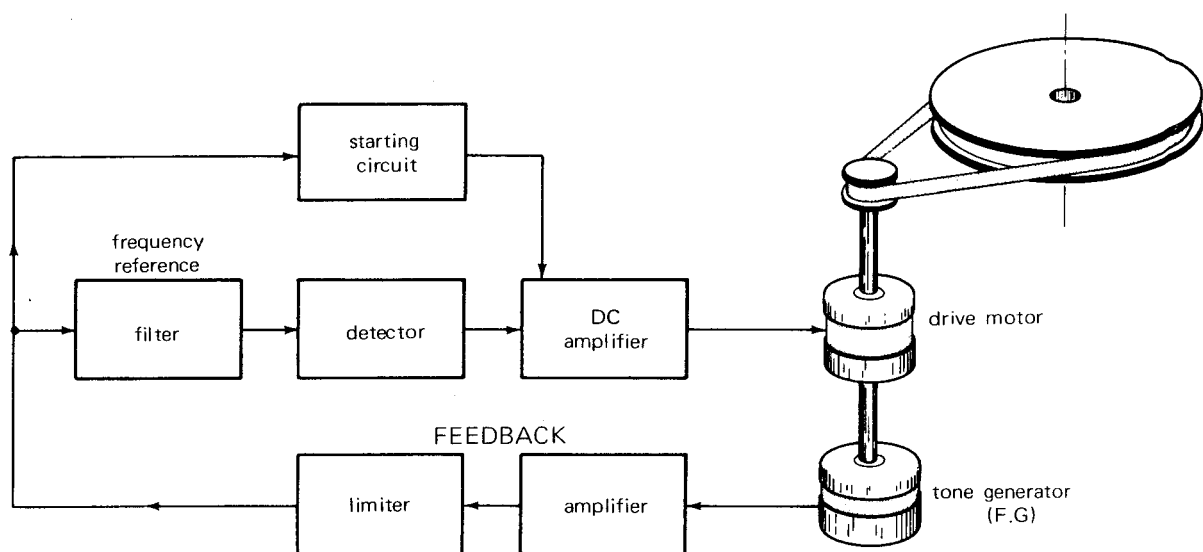


Fig. 1-1 Servo system block diagram

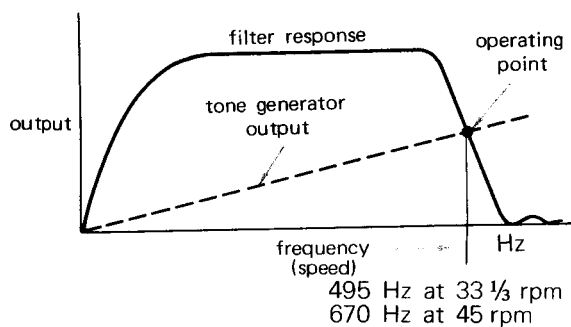


Fig. 1-2 Operating characteristics

For instance, if the motor should turn faster, perhaps due to a decrease in mechanical load, the output frequency of the tone generator would increase. This would cause a drop in the output of the filter and a subsequent drop in motor current and speed. Thus, the system automatically corrects changes in rotational speed regardless of the cause. A very tight control of the speed is maintained because the slope of the filter response is very steep at the operating point (70 dB per octave). Therefore, a slight change in speed results in a large correction current.

The following describes the functions of all stages and controls. The text follows signal paths. Stages are listed by transistor reference designation at the left margin; major components are also listed in a similar manner. Refer to the block diagram on page 1 and the schematic diagram on page 11.

Servo Amplifier Section

Stage/Control	Function
Tone generator	The tone generator (FG) is directly coupled to the shaft of the drive motor, thus allowing speed to be effectively converted into frequency. The output of the tone generator is then compared with a very-stable frequency reference.
Ac amplifier Q1	This conventional common-emitter amplifier amplifies the small signal produced by the tone generator to the level required at the input of the filter circuit.
Limiter V1	Limiter V1 removes all amplitude variations from the signal. Varistor VR-60 conducts when the signal across it exceeds the barrier potential (0.6 V) in a

Stage/Control	Function
Low-pass filter R5, C24, R6, C3, C4 R11, C8, R12, C9, C10	forward bias condition. Thus the output signal is limited to 1.2 V peak-to-peak.  This two-stage RC passive filter eliminates higher-order harmonics and noise. Only the fundamental-frequency component is passed.
Modified Twin-T filters R7 to R10 } 45 rpm C3 to C7 } R13 to R16 } 33 rpm C9 to C13 } S1, S2	This filter has a steep unsymmetrical frequency response at the operating frequency. To obtain the proper response curve at each frequency, a separate filter network is used for each turntable speed. Switches S1 and S2 select the operating speed. Resistors R10 and R16 turn the filters to the correct cutoff frequencies. Overall filter response is determined by the resultant of the low pass and modified twin-T filters.
Emitter follower Q2	Transistor Q2 accepts the output of either of the two twin-T filters and provides a high input impedance to prevent loading of the filter circuit.
SPEED adj. control R20	Controls input signal level fed to the following stages.
Voltage amplifier Q3	Amplifies the signal to the level required for rectification.
Rectifiers D1, D2	Rectifies the ac signal that appears at the secondary winding of T1. The rectified signal is then filtered by C18 and applied to dc amplifiers Q5 and Q7.
Dc amplifiers Q5, Q7	This two-stage dc amplifier uses a Darlington configuration. It controls the current supplied to the drive motor. Q7 is a power transistor to accommodate the current demand of the motor.
Starting circuit R30, R29, R28, D3, Q4	To move the turntable, a starting circuit is required that feed initial drive current to the

Stage/Control	Function	Stage/Control	Function
	<p>motor and cuts it automatically after the turntable reaches its operating speed. The starting circuit operates as follows :</p> <p>When power switch S3 is closed, the power supply is energized and diode D3 is biased into conduction. Since transistor Q4 is cutoff (because of no input to rectifier diode D5), positive voltage is supplied to the base of Q5 through the voltage divider consisting of D3, R28, R29, and R30. As a result Q5 and Q6 conducts heavily and a relatively large current is supplied to the drive motor to start it. As the motor and tone generator come up to their correct operating speed, the tone generator's ac output increases and Q4 conducts. The collector resistance shorts the junction of R30 and R29 to ground. This largely removes the voltage which originally biased the motor-control transistors into conduction. However, by this time the regular control voltage from the full-wave rectifier has increased to the point where it assumes control. The combined effect of these voltage changes reverse biases D3 and effectively disconnects the base of Q5 from the components which cause heavy conduction when the turntable is first turned on.</p>		<p>to voltage regulator Q6. The base of Q6 is clamped at approximately 6.7 volts by Zener diode D4. The emitter voltage differs from the base voltage of the transistor by only a fraction of a volt, so that the output voltage of the regulator (taken from the emitter) will vary by only a few tenths of a volt from full load to no load.</p>

Power Supply Section

Rectifier D7 to D10	The bridge rectifier consisting of diodes D7—D10 provides about 12 volts dc for the voltage regulator and motor-control circuits.
Voltage regulator Q6	DC output from the rectifier is filtered by C22 and applied

## SECTION 2

### DISASSEMBLY AND REPLACEMENT PROCEDURES

#### 2-1. TOOLS REQUIRED

The following tools and materials are required to perform disassembly and replacement procedures on the TTS-3000A:

Screwdrivers (medium and small sizes)  
 Phillips head screwdriver  
 Protective pad or mat (about 2 ft. square)  
 Long-nose pliers  
 Adjustable wrench  
 Contact cement  
 Cement solvent  
 Soldering iron  
 Rosin-core solder

#### WARNING

Before starting any disassembly or replacement, unplug the ac power cord.

#### 2-2. TURNTABLE REMOVAL

1. Remove the rubber mat from the turntable.

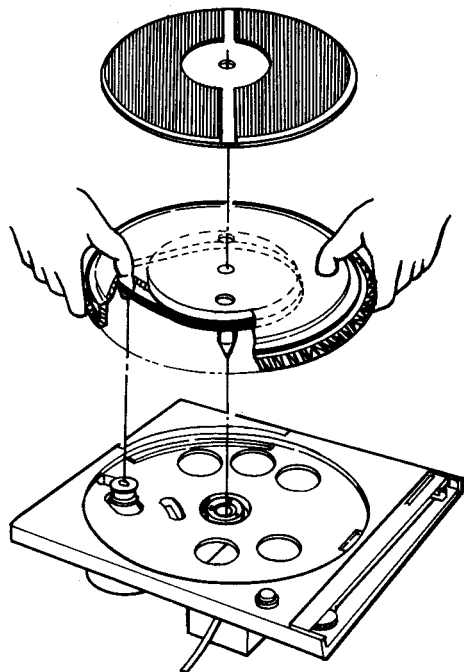


Fig. 2-1 Turntable removal

2. Insert your thumbs into the two large holes of the turntable. Hook one of the thumbs inside the rubber belt to pull it off the drive wheel as shown in Fig. 2-1.
3. Pull the turntable upward. Be careful not to damage the outer strobe disc of the turntable when removing the turntable.
4. Place the turntable on a soft protective pad with the top side facing downward.

#### 2-3. TURNTABLE-BASE REMOVAL

1. Remove the turntable as described in Procedure 2-2.
2. The turntable base is secured to the wooden case or the motor board in one of two ways: By four wood screws inserted from the top of the cast turntable base as shown in Fig. 2-2, or by four machine screws threaded into the base from the bottom of the motor board as shown in Fig. 2-3. Remove the four mounting screws and carefully lift up the turntable base.
3. Place it on a soft protective pad.

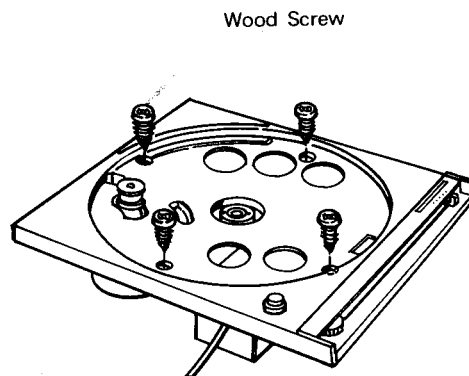


Fig. 2-2 Turntable-base removal

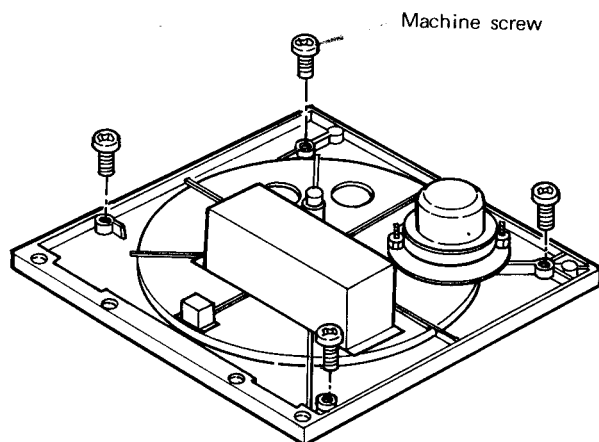


Fig. 2-3 Turntable-base removal

## 2.4. SERVO-AMPLIFIER SHIELD-CASE REMOVAL

1. Remove the turntable base as described in Procedure 2-3.
2. Remove the four screws (+RF 3×6) that hold the shield case on the turntable base. See Fig. 2-4.
3. Turn over the shield case containing the servo amplifier.
4. Remove the eight screws (+RF 3×4) securing both side panels to the shield case. See Fig. 2-4.

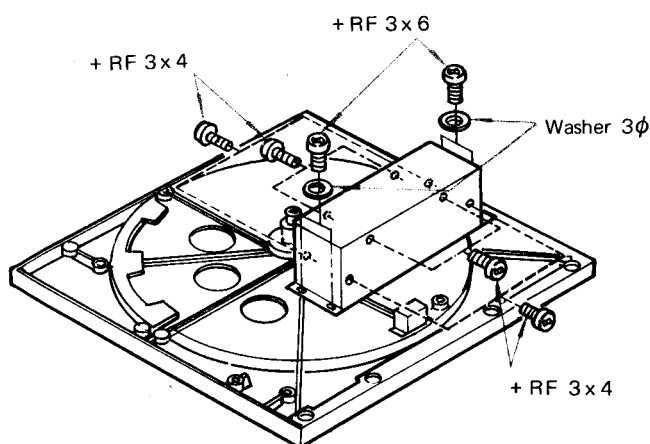


Fig. 2-4 Servo-amplifier shield case removal

## 2.5. DRIVE-MOTOR REPLACEMENT

1. Remove the turntable base as described in Procedure 2-3.
2. Unsolder the four leads from the 4-p terminal which connect the motor and servo-amplifier board.
3. Remove the motor pulley from the motor shaft by loosening the two set screws shown in Fig. 2-5.
4. Remove the three screws (+RF 4×6) that secure the motor-supporting bracket to the turntable base as shown in Fig. 2-6.
5. Remove the three mounting screws from the motor supporting bracket as shown in Fig. 2-7.
6. Install a new motor and proceed to Section 3. Perform Procedure 3-2 MOTOR PULLEY-HEIGHT ADJUSTMENT, and 3-3 BELT TENSION ADJUSTMENT.

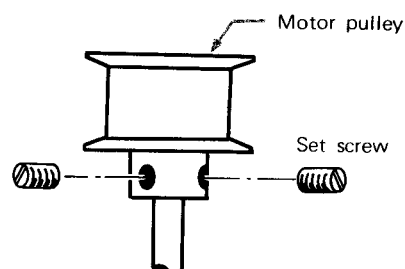


Fig. 2-5 Motor pulley removal

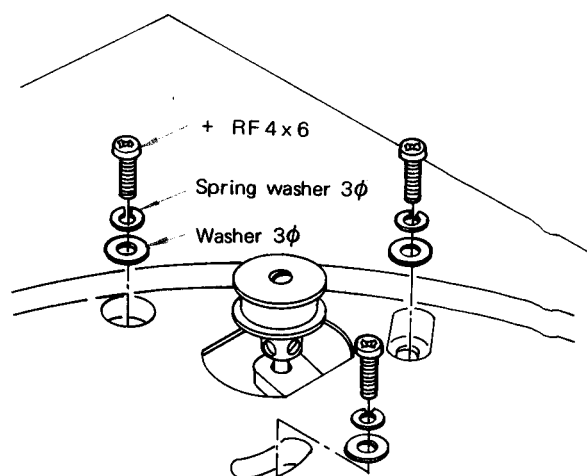


Fig. 2-6 Motor support bracket removal

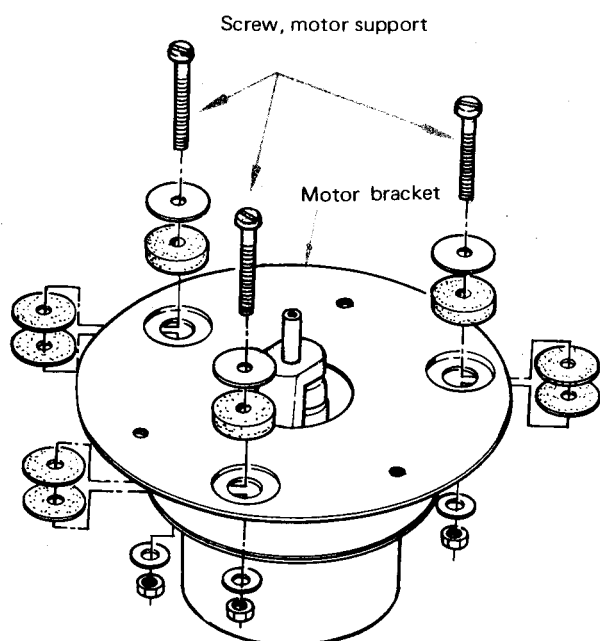


Fig. 2-7 Drive motor removal

## 2-6. POWER-TRANSFORMER REPLACEMENT

1. Remove the servo-amplifier shield case as described in Procedure 2-4.
2. Remove the two screws (+RF 3×8) that hold the transformer to the transformer-mounting plate, as shown in Fig. 2-8.
3. Unsolder the leads on the lugs of the transformer and take out the transformer, rubber cushion and two brackets.
4. Install a new transformer with the rubber cushion and the two brackets and solder the lead wires.

## 2-7. MICRO-SWITCH REPLACEMENT

1. Remove the two screws (+RF 3×5) that secure the 33-OFF-45 lever to its arm as shown in Fig. 2-9.
2. Remove the lever.
2. Remove the three screws (+RF 3×8) holding the microswitch mounting bracket to the turntable base as shown in Fig. 2-9.
4. Remove the bracket and switches.

5. Remove the two screws (+RF 3×16, +RF 3×18, or +RF 3×25) that hold the defective micro switch.

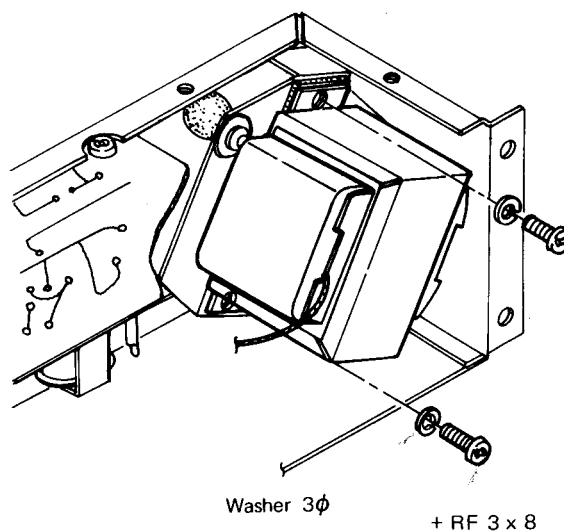


Fig. 2-8 Power transformer replacement

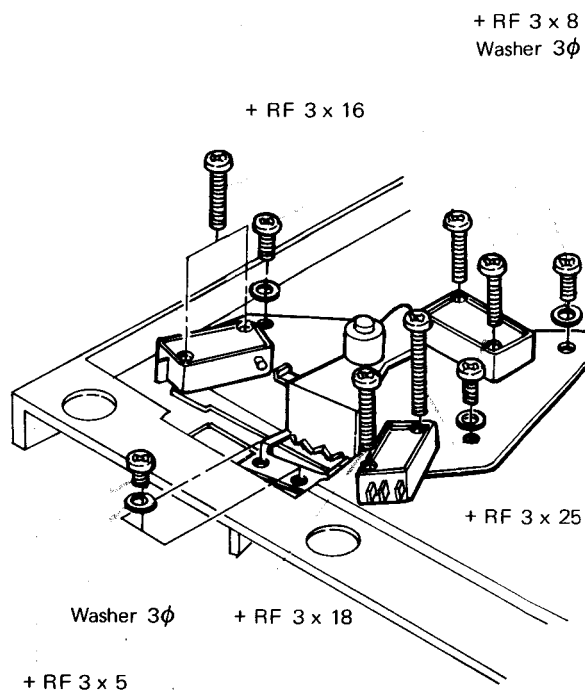


Fig. 2-9 Microswitch replacement

## 2-8. STROBE-LAMP REPLACEMENT

1. Remove the two screws (+RF 3×5) securing the plastic strobe lamp cover as shown in Fig. 2-10.

2. Unsolder the two leads of the defective neon lamp from the terminal strip and install a new lamp.

## 2-9. SPEED CONTROL REPLACEMENT

1. Remove the two screws (+RF 3×6) that secure the SPEED control mounting bracket to the turntable base as shown in Fig. 2-11.
2. Pull off the control knob.
3. Loosen the hex nut securing the SPEED control and remove it.
4. Install a new control.

## 2-10. REMOVAL OF TURNTABLE-BASE ATTACHMENT

On some versions of the TTS-3000A equipped with a short tone arm the upper right corner of the turntable base can be removed as follows:

1. Remove the turntable base as described in Procedure 2-3.
2. Remove the three screws (+T 4×6) that hold the corner to the turntable base.

## 2-11. ORNAMENTAL PLATE REMOVAL

1. Remove the turntable base as described in Procedure 2-3.
2. Remove the SPEED control knob and the 33-OFF-45 lever as described in Procedures 2-9 and 2-7.
3. Apply a drop of cement solvent through the five holes located in back of the ornamental plate. Be careful not to set any solvent on the surface of the turntable base.
4. Wait a few seconds for the cement to soften, then pry the plate off.
5. Attach the new plate with contact cement. Take care not to squeeze the cement out on the surface of the turntable base.

## 2-12. STROBE-SKIRT REMOVAL

1. Remove the turntable and the drive belt as described in Procedure 2-2.
2. Remove the eight screws (+RF 3×10) holding the plastic strobe skirt to the turntable.
3. Remove the skirt and replace it with the new one.

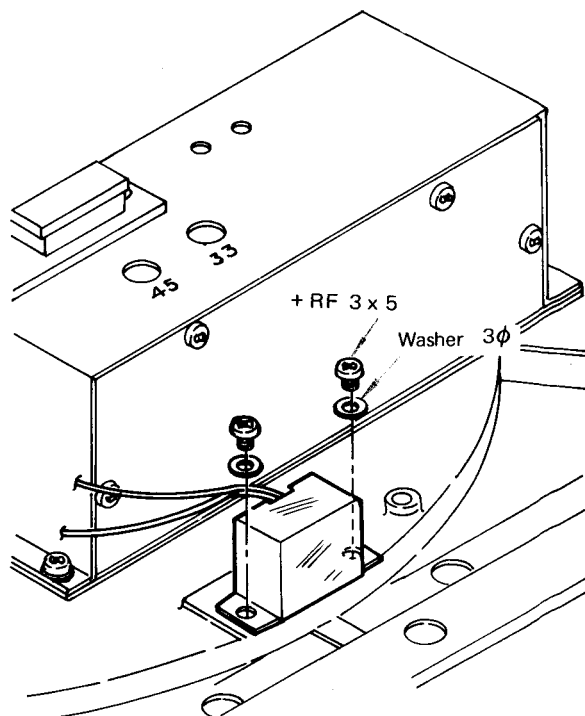


Fig. 2-10 Strobe lamp removal

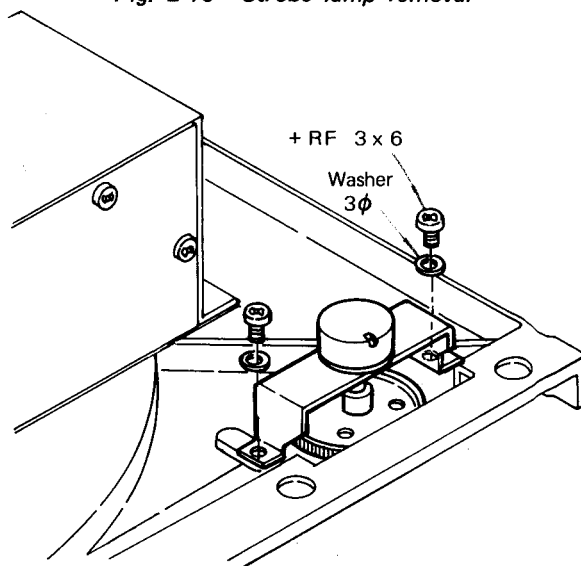


Fig. 2-11 Speed control replacement

## SECTION 3

### ADJUSTMENT AND LUBRICATION

#### WARNING

Before starting any adjustment and lubrication except the SPEED control adjustment, unplug the ac power cord and two phono plugs.

#### 3-1. SPEED CONTROL ADJUSTMENT

Correct operating speed should be obtained when the SPEED control is at or near the mid-range setting.

1. Place the turntable in the horizontal position.
2. Set the SPEED control to mid position.
3. Set the 33-OFF-45 lever to 33.
4. Turn the semi-fixed resistor for the 33-1/3 rpm speed with a screwdriver as shown in Fig. 3-1 until the strobe skirt indicates correct operating speed.
5. Switch the 33-OFF-45 lever to 45 and repeat the procedure described in Step 4 for the 45 rpm semi-fixed resistor.

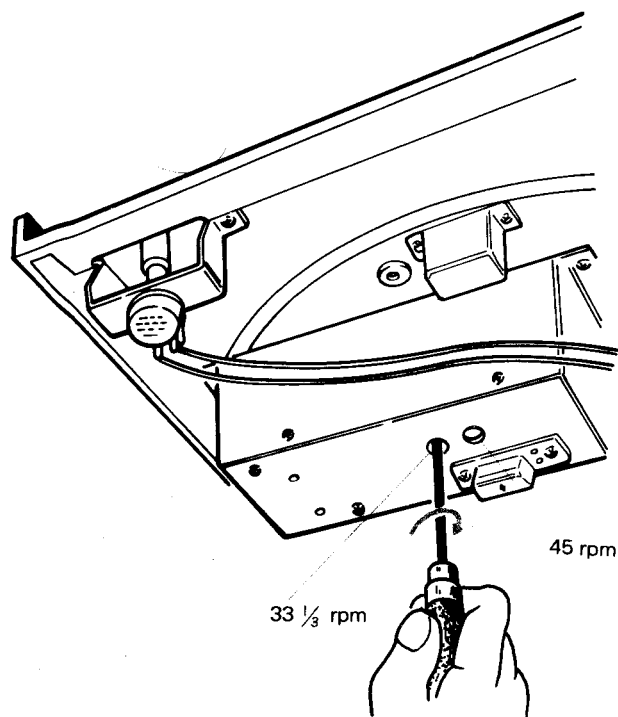


Fig. 3-1 Speed control adjustment

#### 3-2. MOTOR PULLEY-HEIGHT ADJUSTMENT

1. Remove the turntable as described in Procedure 2-2.
2. Loosen the two set screws on the motor pulley as shown in Fig. 3-2.
3. Turn the top screw on the motor pulley with a screwdriver to get the specified pulley height as shown in Fig. 3-2. The motor-pulley height between the top of the pulley and the turntable base should be  $11/16'' \pm 1/16''$  (17 mm  $\pm$  1 mm).
4. Perform Procedure 3-3 Belt Tension Adjustment.

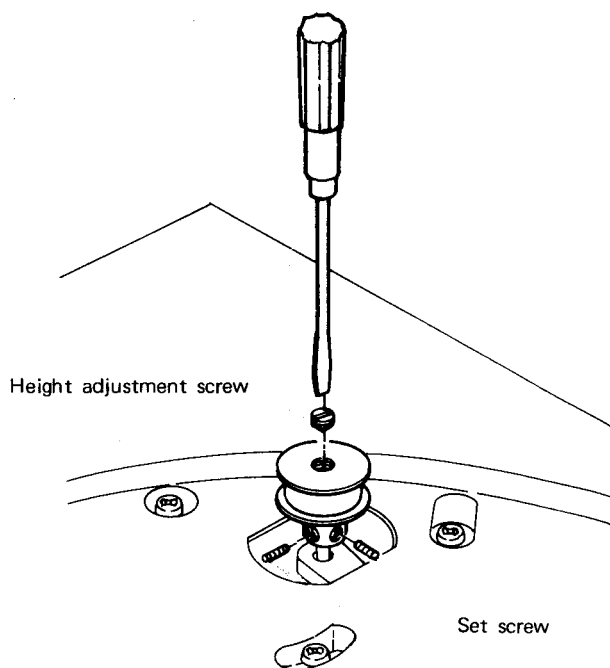


Fig. 3-2 Motor pulley-height adjustment

#### 3-3. BELT TENSION ADJUSTMENT

NOTE: Before performing this adjustment, follow Procedure 3-2 MOTOR-PULLEY HEIGHT ADJUSTMENT.

Drive Belt tension has been preset at the factory. This procedure is therefore usually performed only after the drive motor or drive belt has been replaced. However, if belt tension appears loose at any time, remove the turntable (see Procedure 2-2), and check the length of the belt against a new one from stock.



Replace the belt if it has stretched or it is cracked or worn. If a normal belt does not give proper tension, follow the procedure described below.

1. Loosen the three mounting screws holding the motor-mounting bracket to the turntable base as shown in Fig. 3-3.
2. Reset the position of the motor so that the belt has proper tension.
3. Tighten the three mounting screws.

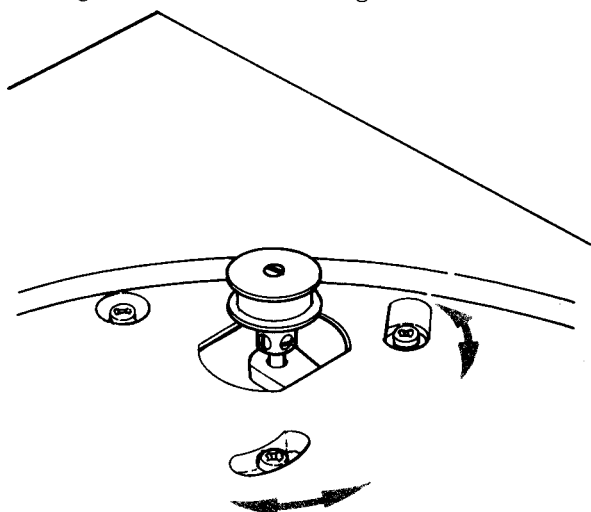


Fig. 3-3 Belt tension adjustment

### 3-4. TURNTABLE HEIGHT ADJUSTMENT

The point of the turntable shaft rests on a hardened steel surface at the bottom of the bearing assembly, as shown in Fig. 3-4. The steel surface is a cushioned insert housed in the thrust screw that threads into the bearing assembly from the bottom. Turntable height is therefore determined by the position of the thrust screw. To adjust turntable height, proceed as follows:

1. Remove the turntable base as described in Procedure 2-3.
2. Pull off the cap at the bottom of the bearing assembly. See Fig. 3-4.
3. Install the turntable without the rubber drive belt.
4. Turn the thrust screw to make the top surface of the strobe skirt just flush with or slightly below the surface of the turntable base. See Fig. 3-4.

5. Replace the bearing cap.
6. Check the motor pulley height, and readjust it if necessary as described in Procedure 3-2 MOTOR PULLEY HEIGHT ADJUSTMENT.
7. Reassemble the turntable.

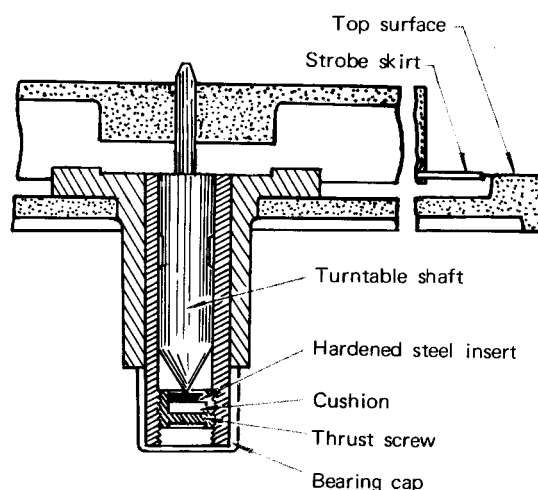


Fig. 3-4 Turntable height adjustment

### 3-5. LUBRICATION

The TTS-3000A motor bearings are completely sealed and need no lubrication under normal conditions. However, the turntable shaft requires lubrication every three months.

1. Remove the turntable as described in Procedure 2-2.
2. Wipe the dust from the belt with a dry cloth.
3. Clean the motor pulley and the turntable drive surface carefully with a soft cloth moistened with denatured alcohol.
4. Apply two or three drops of SONY Oil OL-2K to the shaft of the turntable. Do not get any oil on the drive components.
5. Reinstall the turntable and drive belt.

### 3-6. LINE FREQUENCY CHANGEOVER

Although the drive motor and the servo amplifier functions are absolutely independent of the power line frequency, a change in the location of the strobe

mask is required when the TTS-3000A is operated at other power-line frequency.

1. Remove the turntable as described Procedure 2-2.
2. Remove the two screws (+RF 3×5) holding the strobe mask.
3. Turn the strobe mask over and reinstall it as shown in Fig. 3-5 (a) or (b), depending on what the new power frequency is.
4. Reinstall the turntable.

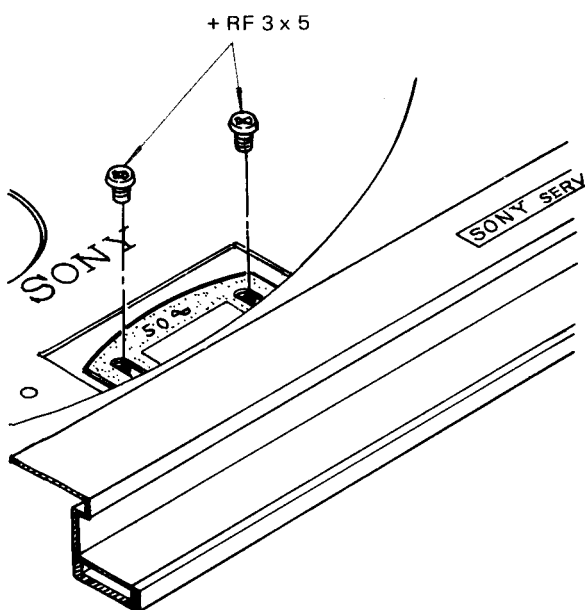


Fig. 3-5(a) Strobe mask installation

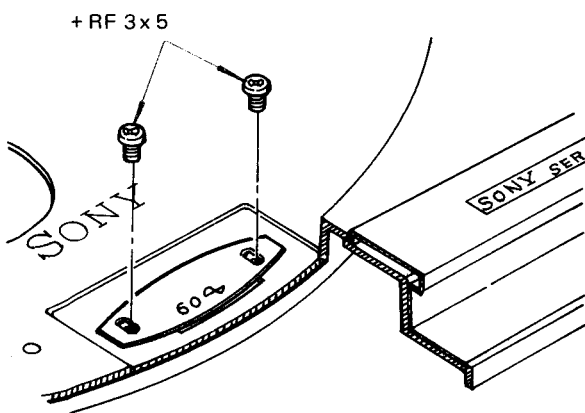


Fig. 3-5(b) Strobe mask installation

### 3.7. SUSPENSION SYSTEM ADJUSTMENT

In the TAC-2A and TAC-3A, the mounting base of the TTS-3000A is isolated from the player base by means of acoustically-damped coil springs. Figure 3-6 shows how the coil springs are placed in the mounting base. Spring tension is adjustable at each foot by turning the threaded rod with a screwdriver.

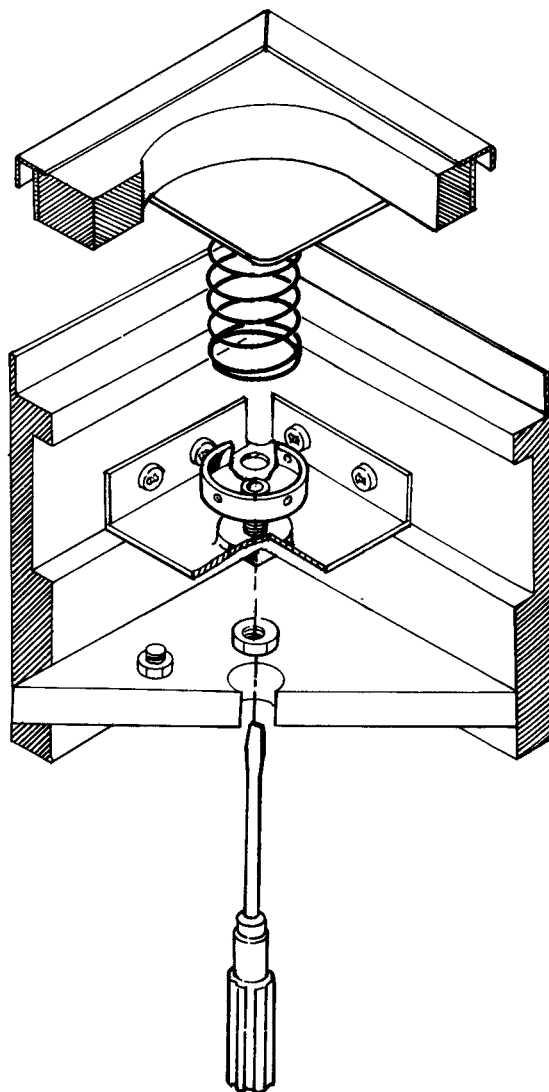
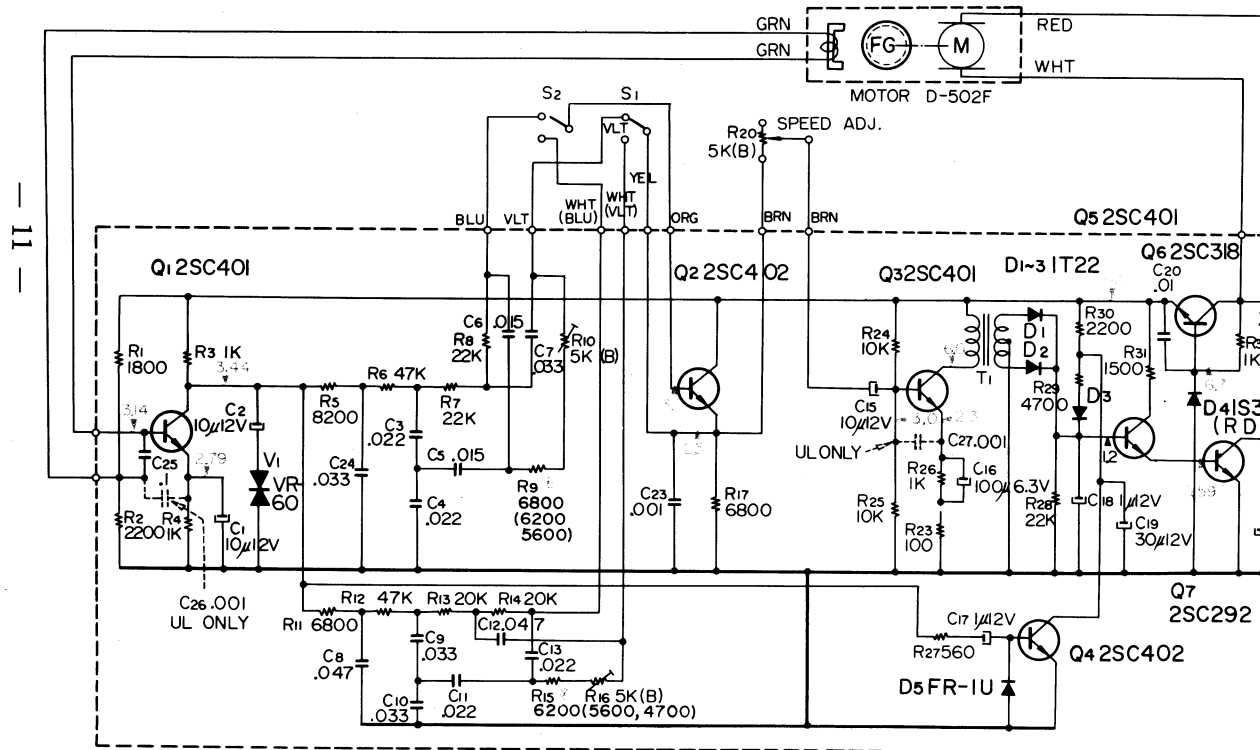


Fig. 3-6 Suspension system

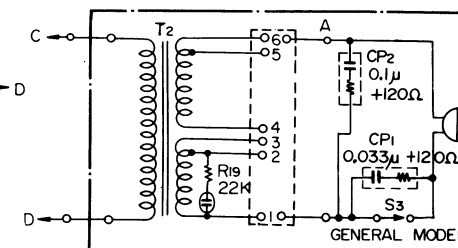
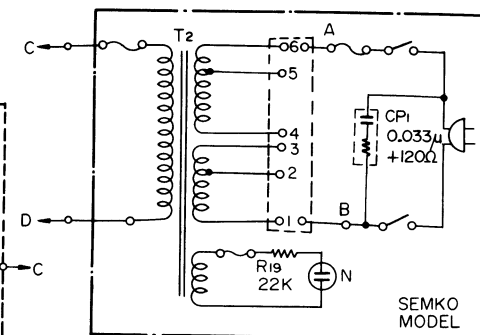
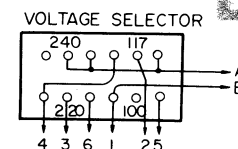
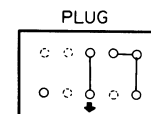
### 3.8. SERVO-FAILURE PREVENTION

A few field reports have indicated servo failure due to very-strong rf interference. In all cases reported, the turntable has been operated at or very near an fm broadcasting station. This interference can be overcome by soldering by-pass capacitors (0.001μF) between base and emitter of Q1 and Q3.

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Resistance value should be selected.



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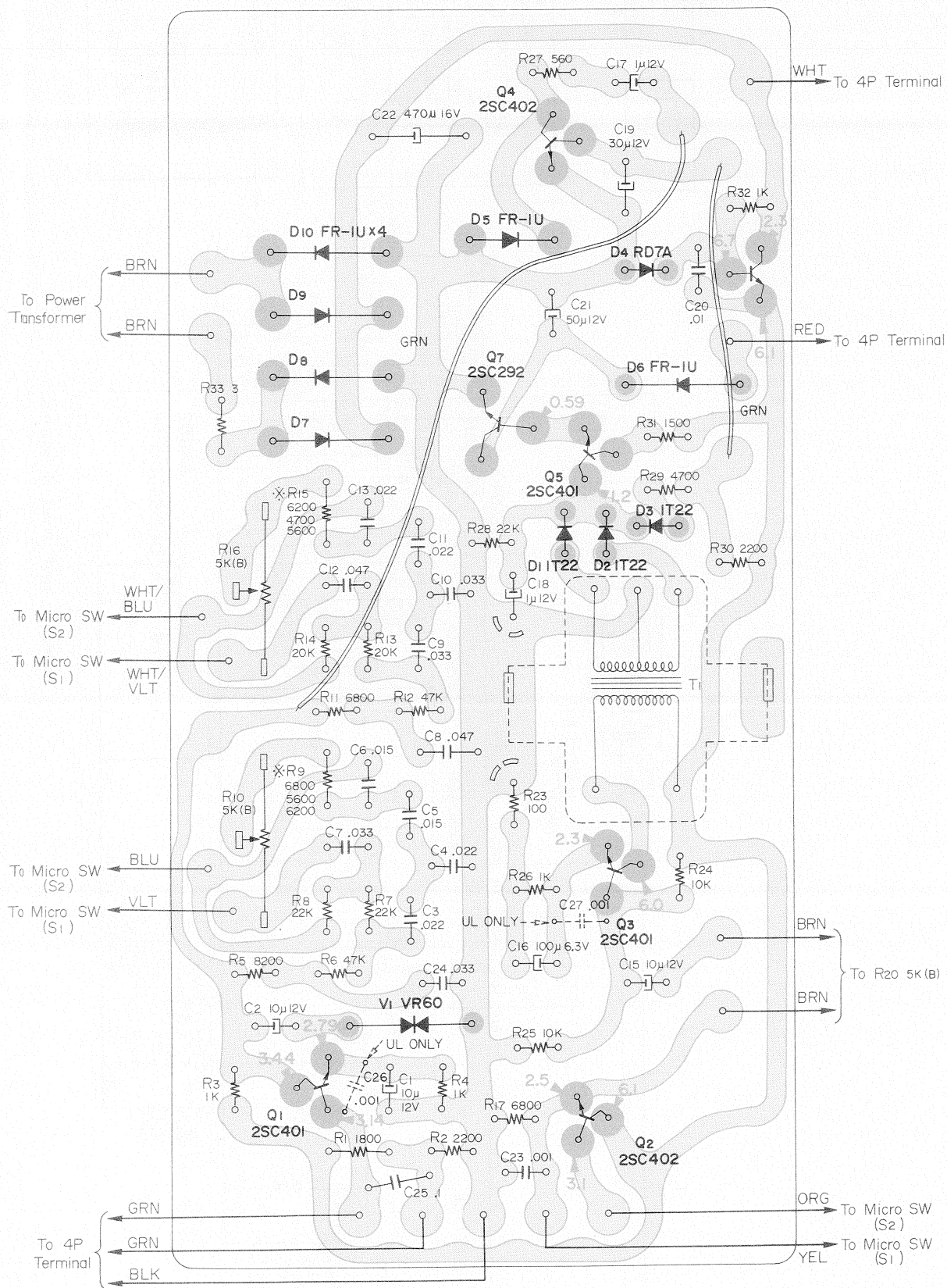
SONY® TTS-3000A

TTS-3000A

# ROUTING DIAGRAM

## Servo Amplifier

— Conductor Side —

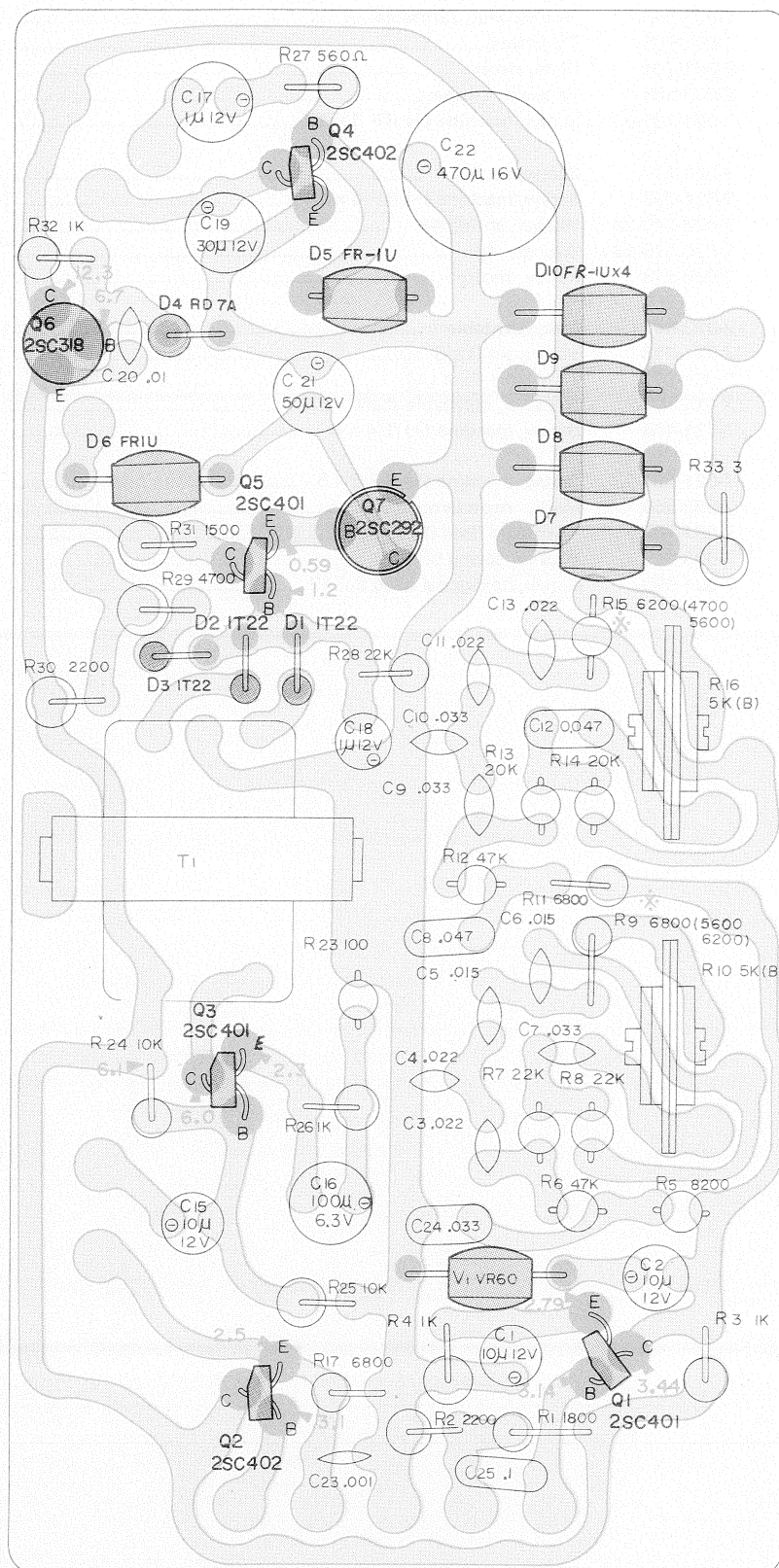


Note: \* Resistance Value Should be Selected.

## MOUNTING DIAGRAM

## Servo Amplifier

— Component Side —

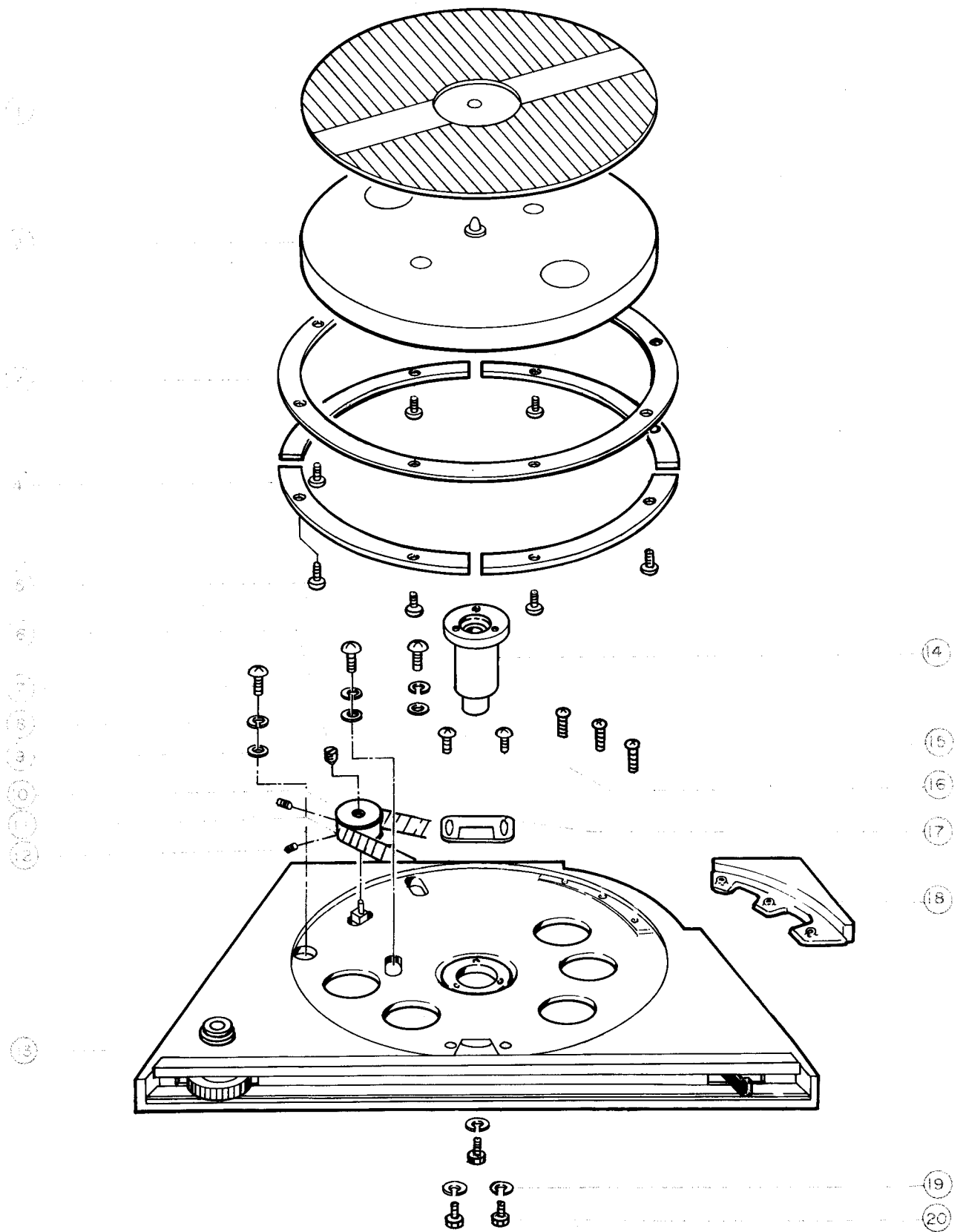


Note: \* Resistance Value Should be Selected.

## REPLACEMENT PARTS LIST

Ref. No.	Part No.	Description	Q'ty
1	2-033-543	Rubber Mat, turntable .....	1
2	2-061-703	Turntable .....	1
3	2-061-704	Plate, strobe .....	1
4	2-033-585	Retainer, strobe .....	4
5	7-621-261-63	Screw, machine (+) RF 3 x 10 .....	8
6	7-621-717	Screw, set 5 x 4 .....	1
7	7-621-268	Screw, machine (+) RF 4 x 12 .....	3
8	7-623-210-28	Washer, spring 4 $\phi$ .....	3
9	7-623-110-12	Washer, 4 $\phi$ .....	3
10	2-033-518	Pulley, motor .....	1
11	2-033-542	Belt, turntable .....	1
12	7-621-713	Screw, set 3 x 3 .....	2
13	2-061-701	Turntable Base (A) .....	1
14	X-20335-02	Retainer, turntable shaft .....	1
15	7-621-468	Screw, machine (+) T 4 x 6 .....	3
16	7-621-261-33	Screw, machine (+) RF 3 x 5 .....	2
17	2-033-550	Mask, neon lamp .....	1
18	2-061-702	Turntable Base (B) .....	1
19	7-623-212	Washer, spring 5 $\phi$ .....	3
20	7-621-999	Screw, hexagonal head 5 x 12 .....	3

EXPLODED VIEW (1)

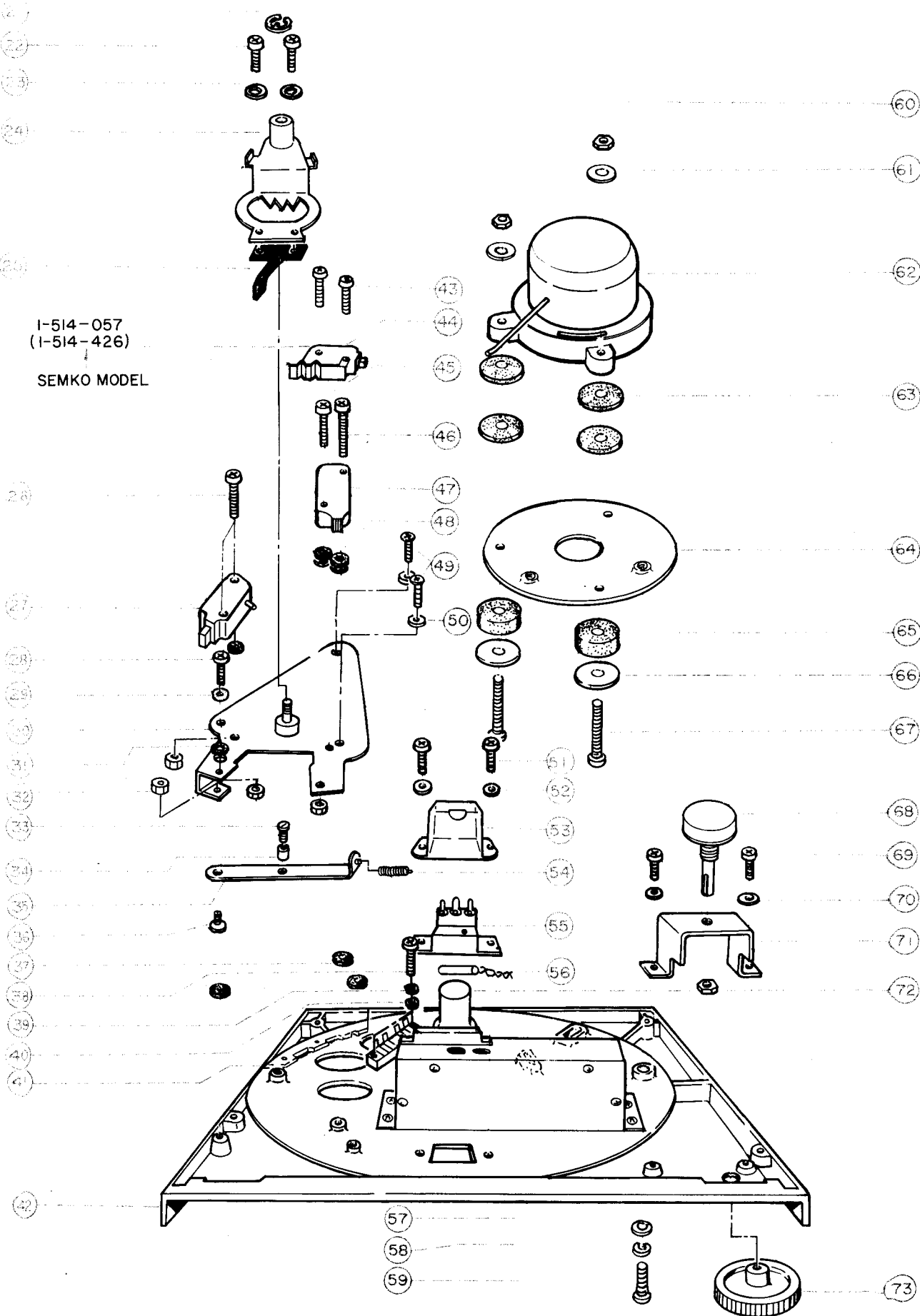


## REPLACEMENT PARTS LIST

Ref. No.	Part No.	Description	Q'ty
21	7-624-109	Retaining Ring 5 $\phi$ (E) .....	1
22	7-621-261-33	Screw, machine (+) RF 3 x 5 .....	2
23	7-623-108-12	Washer 3 $\phi$ .....	2
24	2-033-514	Arm Ass'y, 33-OFF-45 selector .....	1
	(2-049-215)	SEMKO MODEL	
25	2-033-530	Lever, 33-OFF-45 selector .....	1
26	7-621-262-03	Screw, machine (+) RF 3 x 16 .....	2
27	1-514-057	Microswitch .....	1*
28	7-621-261-53	Screw, machine (+) RF 3 x 8 .....	1
29	7-623-208-27	Washer, spring 3 $\phi$ .....	1
30	2-033-512	Housing, 33-OFF-45 selector .....	1
	(2-049-213)	SEMKO MODEL	
31	2-033-529	Washer, fiber .....	4
32	7-622-308	Nut, 3 $\phi$ .....	8
33	2-033-555	Screw .....	1
34	2-033-554	Collar, restrictor lever .....	1
35	2-033-553	Lever, restrictor .....	1
36	2-033-531	Screw .....	1
37	2-033-560	Washer, rubber .....	3
38	7-621-261-73	Screw, machine (+) RF 3 x 12 .....	2
39	7-623-208-27	Washer, spring 3 $\phi$ .....	2
40	7-623-108-12	Washer 3 $\phi$ .....	2
41	1-536-029	Terminal Strip 4P .....	1
42	2-061-701	Turntable Base (A) .....	1
43	7-621-262-03	Screw, machine (+) RF 3 x 16 .....	2
44	2-033-528	Spring, power ON/OFF switch .....	1
45	7-621-162	Screw, machine (+) RF 3 x 18 .....	1
46	7-621-262-53	Screw, machine (+) RF 3 x 25 .....	1
47	1-514-057	Microswitch .....	1
48	2-033-529	Washer, fiber .....	4
49	7-621-261-53	Screw, machine (+) RF 3 x 5 .....	2
50	7-623-108-12	Washer 3 $\phi$ .....	2
51	7-621-261-33	Screw, machine (+) RF 3 x 5 .....	2
52	7-623-108-12	Washer 3 $\phi$ .....	2
53	3-403-808	Cover, neon lamp .....	1
54	2-033-557	Spring, restrictor lever .....	1
55	2-033-565	Terminal Strip .....	1
56	1-519-017	Lamp, neon .....	1
57	7-623-110-12	Washer 4 $\phi$ .....	3
58	7-623-210-28	Washer, spring 4 $\phi$ .....	3
59	7-621-268-73	Screw, machine (+) RF 4 x 12 .....	3
60	7-622-308	Nut 3 $\phi$ .....	3
61	2-033-523	Washer (A) .....	3
62	8-834-502	Motor (D-502F) .....	1
63	2-033-520	Cushion (A), motor .....	3
64	2-033-519	Bracket, motor .....	1
65	2-033-521	Cushion (B), motor .....	3
66	2-033-535	Washer (B) .....	3
67	2-033-522	Screw, motor holding .....	3
68	1-221-727	Potentiometer, fine speed control .....	1
69	7-621-261-43	Screw, machine (+) RF 3 x 6 .....	2
70	7-623-108-12	Washer 3 $\phi$ .....	2
71	2-033-561	Bracket, fine speed control .....	1
72	2-033-502	Cap, bearing .....	1
73	3-418-130	Knob, speed control .....	1



EXPLODED VIEW (2)



## REPLACEMENT PARTS LIST

Ref. No.	Part No.	Description	Q'ty
74	7-621-261-43	Screw, machine (+) RF 3 x 6 .....	1
75	1-526-165	Selector, voltage .....	1
76	2-033-562	Servo Amp Chassis .....	1
77	7-623-408	Washer 3 $\phi$ , locking .....	3
78	7-621-261-43	Screw, machine (+) RF 3 x 6 .....	3
79	2-033-563	Cover, chassis .....	1
80	7-621-261-33	Screw, machine (+) RF 3x4 .....	4
81	7-623-108-12	Washer 3 $\phi$ .....	2
82	7-622-308	Nut 3 $\phi$ .....	1
83	2-033-539	Terminal Strip .....	1
84	2-033-540 (2-049-217)	Plate, shield .....	1
85	7-621-261-33	Screw, machine (+) RF 3 x 4 .....	2
86	7-623-208-27	Washer, spring 3 $\phi$ .....	2
87	7-623-108-12	Washer 3 $\phi$ .....	2
88	2-033-595	Cover, voltage selector .....	1
89	7-621-261-73	Screw, machine (+) RF 3 x 12 .....	1
90	2-061-706	Label, specification .....	1
91	7-621-261-23	Screw, machine (+) RF 3 x 4 .....	4
92	2-033-563	Plate, servo amp shield .....	1
93	7-621-261-43	Screw, machine (+) RF 3 x 6 .....	4
94	7-623-108-12	Washer 3 $\phi$ .....	4
95	0-049-136	Rubber, cushion .....	4
96	2-033-534	Bracket, power transformer .....	1
97	7-624-108	Retaining Ring 4 $\phi$ (E) .....	4
98	2-033-534	Stopper, power transformer .....	1
99	2-033-584	Spacer, power transformer, rubber .....	1
100	1-441-207	Transformer, power T2 .....	1
101	7-623-108-12	Washer 3 $\phi$ .....	2
102	7-621-261-53	Screw, machine (+) RF 3 x 8 .....	2

EXPLODED VIEW (3)

